GEOGRAPHY AT THE BRITISH ASSOCIATION.

WHEN the British Association last met at Dundee in 1867 the president of Section E, Sir Samuel Baker, had but lately returned from his discovery of the Albert Nyanza. In his presidential address for 1912 Colonel Sir Charles Watson returned to the subject of the Sudan, pointing out how much and yet how little has been learnt since the time of Sir Samuel Baker. In 1869 Sir Samuel Baker was appointed by the Khedive Ismail governor of the country south of Gondokoro, with instructions to extend the Khedive's authority as far south as possible. Owing to the increase of the Sudd and the inadequacy of his forces, little was accomplished at his return in 1873. The same post was held from 1874 to 1876 by Colonel Gordon, who for three years from 1877 was governor-general of the whole Sudan. Pressure of administrative work lessened the opportunities of geographical discovery, and after 1881 the Sudan was closed to Europeans until 1898. Few know how limited is our knowledge of the Sudan even to-day. Small scale maps convey the impression that more is known than is really known, and whatever appears on a carefully engraved map comes to be accepted as true for all time. The course of the Blue Nile itself from Lake Tsana to Famaka, the upper waters of the Atbara, Rahad Dinder and Sobat, and the mountains from which they flow, still await exploration, while great areas of the level plains remain not only unsurveyed, but unvisited. A complete trigonometrical survey is out of the question for many years to come, and though there has been a wonderful increase in our knowledge, though the blank spaces will be gradually filled, the task of geographers in the Sudan is not even half-completed.

In the absence of the Director-General of the Ordnance Survey, Captain E. O. Henrici, R.E., read his paper on the international map, and exhibited the five sheets hitherto published. The discussion on this paper strongly supported the president's criticisms of the colour scheme, and a general feeling was manifested in favour oi a black and white edition of the map.

A valuable paper by Mr. E. A. Reeves dealt with recent improvements in surveying instruments, including those which deal with astronomical observation, triangulation and levelling, such as lamps for theodolites, invar tape and reflecting levels, and also the latest instruments for plotting the facts observed, such as the stereo plotter, Orel's stereo-autograph, telescopic alidades, and the latest advances in photographic surveying. Great interest was shown in an exhibition of road-books and atlases which illustrated Sir H. G. Fordham's bibliography of British and Irish road-books and itineraries from Leland to Ogilby, from Ogilby to Cary, and in the last period from 1798 to about 1850, when railways made itineraries except Bradshaw unnecessary. This paper included some references to the road-books of France.

African geography was pursued further by Dr. Felix Oswald, who gave some of the results of his journeys between the Victoria Nyanza and the Kisii Highlands, and Mr. G. W. Grabham, who dealt with the country northward from Lake Albert. Mr. W. J. Harding King, in his paper on the Libyan Desert, pointed out that the sand dunes do not extend so far as was formerly supposed, since a large plateau, starting about 20 miles south-west from Dakkleh oasis and running west, banks up practically the whole of the dunes. Southward of this plateau is a sandy plain rising toward the south; the top of a hill in this plain was found to be 2150 feet above the sea. There are numerous fertile spots south of lat. 20° N. Ennedi is said to be full of Roman remains. Another desert paper was given by Mr. I. N. Dracopoli, who, in speaking of the Sonora Desert of Mexico, dealt with the physical features of the region and the characteristics of the Papago and Seri Indians.

Mr. P. Amaury Talbot gave his experiences of Southern Nigeria, especially in the forest belt lying between the coastal swamps and the grasslands of the interior. As the Yoruba and Ibo territory is better known, he paid most attention to the Cross River district and its ethnography—the Ododop or Korawp forest negroes, the Ojo and Uyanga and the Ekoi, a semi-Bantu people of a high type.

The Antarctic discussion, which occupied the Monday morning, was specially appropriate to Dundee; no fewer than four Antarctic vessels were actually lying in the harbour during the meeting. Sir Clements Markham, to whom with Sir John Murray the revived interest in the Antarctic is mainly due, confined his attention to the expeditions of Captain Scott, Mr. Mawson, and Captain Filchner. Dr. W. S. Bruce gave a full review of the configuration of the continent, both the coast and the interior, as at present known, and then discussed former connections with the southern continents, as suggested by the discoveries of the *Scotia*. Dr. R. N. Rudmose Brown, who opened the discussion, agreed in the main with Dr. Bruce's views of the continental structure. Dr. E. Marshall spoke of the work done by Sir Ernest Shackleton, and Dr. Hodgson of his experiences in the *Discovery*. Prof. Charles Chilton, of New Zealand, discussed the biological evidence for the former land connection with his country.

Two committees were appointed to report to the section at the 1913 meeting, one on the present state of geographical teaching in Scotland, and the other on the choice and style of atlas, textual, and wall-maps.

PHYSIOLOGY AT THE BRITISH ASSOCIATION.

THE proceedings of the Section of Physiology were characterised by two features: the first was that a large number of foreigners attended the meetings of the section, and the second was that a whole day was devoted to subjects bearing on psychology.

Three subjects formed the bases of discussions. One joint discussion on animal nutrition with the Section of Agriculture is described in the report, which appears elsewhere in this issue, of the proceedings of that section.

The second joint discussion on the physiology of aquatic organisms was held with the Section of Zoology. This discussion was opened by Prof. A. Pütter, who gave the arguments in favour of his hypothesis that aquatic animals frequently obtain their food material in dissolved form. By measuring the respiratory exchange it is possible to calculate the amount of organic matter oxidised, and the quantity of organic matter in the form of plankton can be determined. If the plankton is uniformly distributed there is not sufficient particulate material to account for the organic matter oxidised unless the animals deal with disproportionately large amounts of water. He has kept animals for long periods without solid food, and found that they gained in weight. In addition, he determined the amount of dissolved organic matter in sea-water, and found that it was sufficient to account for the respiratory exchange of the animals.

Prof. Benjamin Moore, F.R.S., on the other hand, stated that there was not sufficient dissolved organic matter to account for the respiratory exchange. He considered that the plankton is not evenly distributed, and that the animals, aided by their sense organs, forage for food. In order to show the great activity of the phyto-plankton in forming organic matter, Prof. Moore mentioned that he had found the sea-water to be more alkaline in August than in April. He attributed this change to the removal of carbon dioxide from the water. When one considers the great bulk of water concerned, the change in reaction must mean an enormous synthesis of organic compounds.

Prof. Fil. Botazzi added that the dissolved organic nitrogen in sea-water is not sufficient to nourish the animals, and that sea-water is almost neutral in reaction.

Dr. W. J. Dakin pointed out that plankton collections did not necessarily contain all the particulate food matter contained in the sea. Prof. Pütter had said that food was often absent from the alimentary canal, but this might be due to the rejection of food after the animal was caught. Dr. Dakin had frequently found food in the alimentary canal. He believed that although some animals may live on dissolved organic matter, others certainly ingested particulate matter.

Prof. Leonard Hill, F.R.S., spoke about the effect of high pressures of water on living tissues. Frogs can survive exposure to pressures of 300 atmospheres, but at 400 atmospheres their muscles become opaque and disorganised. Bacteria are killed when the pressure reaches 3000 atmospheres. Prof. Doflein pointed out that protozoa can live on dissolved organic matter, and that digestion causes the solution of all foods before they are absorbed. Dr. F. A. Dixey, F.R.S., stated that insects can construct organic substances from air, and hence sea animals may possibly form organic material from simple dissolved constituents. Dr. N. Annandale described the effect of food in altering the colour of a form of hydra from Bombay. When placed in an aquarium it takes food, and the colour changes. Prof. A. Dendy, F.R.S., considered that all work done on sponges can be discounted because they are usually mixed colonies of plants and animals. Therefore some of the experiments described by Prof. Pütter ought to be repeated with other animals.

The third discussion, on the relation of mind to body, was preceded by a paper by Prof. Max Verworn on the physiological basis of memory and abstraction. In this paper he stated that nerve cells increase in size by use, and that the strength of the nerve impulse depends on the size of the cell body. Thus a series of nerve cells which had not been used should act as a block by causing a gradual decrease in the strength of the nerve impulse until the impulse becomes too weak to pass from one cell to another; whilst a series of well-exercised cells should increase the strength of the impulse. Nerve impulses should therefore tend to be propagated along more frequented paths.

Prof. R. Latta opened the discussion by contrasting the Parallelist and Animist points of view. The former, recognising two independent systems which correspond point for point, involves an extension of the mechanical hypothesis to mind, in utter disregard of the fact that the mechanical hypothesis is founded on the necessity of excluding everything mental from the physical system. The latter insists on the recognition of a teleological factor in organism and mind, placed entirely outside the mechanical system, and requiring an endless series of miracles. His conclusion was that mind cannot be entirely separated from matter, and that the distinction between the physical and the psychical, the mechanical and the teleological, is a distinction within one and the same system.

Sir T. S. Clouston dealt with the effect of diseased conditions, thus emphasising the intimate connection of the structure and chemistry of the brain with the mental processes.

Dr. J. S. Haldane, F.R.S., emphasised that it is impossible to separate mind from the bodily structures, nor can physiological processes be separated from physical and chemical laws. His belief is that the body properly understood is the mind, and that the physical sciences treat of a one-sided aspect of reality. The line of development is that in which the organic extends so as to include the inorganic.

Dr. H. J. Watt maintained that before the problem of the mind-body relation can be raised, it is necessary to form a properly classified catalogue of psychological states, and to determine whether some satisfactory correlation cannot be found among known or possible physiological processes. He urged that the facts adduced by McDougall in favour of interaction are really compatible with the broader views of parallelism.

Dr. C. S. Myers held the most tenable hypothesis to be that of parallelism between neural and mental processes and products, coupled with the realisation that the same difficulties which beset the explanation of the course and nature of mental processes occur on the neural (physiological) side.

Prof. Geddes demonstrated by a diagram that the opposing views are really two aspects of the same thing, depending on whether the attention is fixed on the influence of the organism on the environment, or that of the environment on the organism. Prof. F. Geddes, F.R.S., and Prof. E. H. Starling, F.R.S., each considered that the discussion was premature, and they agreed with Dr. Watt that psychology must advance further before the subject can be profitably discussed. Prof. Leonard Hill, F.R.S., said that, in spite of our inability to reach a conclusion, the human mind seems prone to consider its relation to its environment, and that the present discussion was in deference to this propensity.

Two interesting demonstrations were given. Prof. Heger showed some kinematograph films illustrating the beating of the tortoise heart with the effect of poisons upon it, and the movements of the circulation in crustacea and the frog.

Prof. Leduc illustrated the effect of diffusion by placing drops of a watery suspension of Indian ink on a salt solution. He believes that cells represent dynamic centres which, by centrifugal and centripetal forces, produce the various appearances which we ascribe to cell structure.

Prof. F. Gotch, F.R.S.: In the dark adapted eye the peripheral portion of the retina is more sensitive than the fovea; red vision extends some distance beyond the fovea, but green is confined to it. A green light falling outside the fovea is recognised as a white glare. Owing to the peripheral portion being more sensitive, a feeble light disappears when it is fixed. Hence, after a light has been discovered at night, to distinguish white from green, night-glasses must be used in order to raise the luminosity above the threshold for the fovea.

Dr. Edridge Green criticised for three reasons the report of the Departmental Committee on Sight Tests. The retention of the wool test, the form of lantern, and method of flicker photometry recommended were condemned. In the subsequent discussion all who spoke condemned the wool test, but the form of lantern and flicker photometry were efficiently defended.

At one time an interesting discussion seemed imminent. After a paper by Prof. Hamburger on phagocytosis, Prof. Asher read a paper on cell permeability. The former demonstrated the ingestion of carbon by leucocytes, and described the effect of certain substances on the rate of phagocytosis. Some of these substances, he said, acted because of their action on the lipoid layer of the corpuscles. The latter described the changes in staining capacity brought about by activity in the glands of the nictitating membrane of the frog. These changes, he said, must be independent of any lipoid material surrounding the cells.

Prof. Fil. Bottazzi reported the result of a series of determinations of the physical chemistry of muscle plasma. Dr. Campbell and Prof. A. B. Macallum, F.R.S., found that certain cells of the kidney tubule stain blue after the injection of a mixture of iron and ammonium citrate and potassium ferrocyanide. These authors state that this change will take place only in the presence of acid, and that therefore the cells are excreting acid.

Dr. Cramer reported the results of some metabolism studies on tumour growth. For the same increase in weight transplanted tumours require less protein than does normal growth. Glycogen is used during the period of growth. If the glycogen metabolism is interfered with by thyroid feeding, the transplanted tumours do not develop. Drs. Cramer and Pringle: Thrombokinase from platelets will pass through a Berkefeld filter, but the thrombokinase from tissues will not pass through. Mr. S. Dawson found that brightness discrimination is more accurate with two eyes than with one. There is, however, no summation, as the apparent brightness is the same whether the object is viewed with two eyes or with one.

Prof. Max von Frey described the effect of two adjacent pressure stimuli on each other. A stimulus accompanying another apparently increases the intensity of the one stimulus. The location of two neighbouring stimuli is between the two and nearer to the stronger stimulus.

Prof. Ida Hyde in a series of papers gave the following results. Tripolar electrodes are more efficient and less injurious in blocking nerve impulses than other methods. Afferent impulses more easily blocked than efferent. Afferent fibres were found in the phrenic nerve. The action of alcohol on the cutaneous reflexes of the frog is depressent.

Prof. A. Kossel dealt with the problem whether the guanidine group was or was not free in lysin. He concluded that it was not free.

Prof. H. Kronecker dealt with the distribution of taste sensations. He concluded that compensation occurs in the central organ. Prof. O. Loewi found that strophanthine acts like calcium in antagonising the effect of potassium. Prof. A. B. Macallum, F.R.S., showed slides representing the distribution of potassium in cells. He believes that the distribution is the result of potassium causing a decrease of surface tension at the interface.

Prof. J. J. R. Macleod: Stimulation of splanchnic nerve or hepatic plexus causes hyperglycæmia. A second factor is necessary, namely, the presence of adrenaline. Dr. J. L. McIntyre stated that animals form mental images by which they remember places. Rev. James Marchant read a paper arguing that, instead of devoting our energies to the prevention of race degeneration, we ought to attempt race regeneration.

Prof. C. R. Marshall presented a series of pharmacological papers showing that:—(1) Quarternary ammonium bases act on myo-neural junction; methyl compounds are more active than ethyl compounds. (2) Nitric esters cause vasodilatation by acting on myoneural junction; relative activity corresponds with solubility except in the case of acid compounds, when the carboxyl group appears to exercise an inhibiting action; activity depends on ease of reduction to nitrites in alkaline solution (3) Coriamyrtin and Tutin were contrasted.

Prof. T. H. Milroy concluded from his experiments that the gaseous exchange during apnœa is due to physical causes. Prof. F. H. Pike described the condition of the spinal vasomotor nerves in shock. Mr. H. Reinheimer stated that factors can be given to biological processes so that the value of an organism to the community can be computed in a similar way that factors in political economy enable general values to be calculated. Mr. W. Sack found that injection of extract of corpus luteum caused a retention of nitrogen in female rats, but not in males. This points to the action being upon the female generative organs.

Prof. W. H. Thompson investigated the output of nitrogen after administering arginine. The nitrogen was mainly excreted as urea and ammonia, but a certain amount was unaccounted for. The effect of simultaneous administration of methyl citrate on the excretion of creatin and creatinin was investigated.

Dr. C. W. Valentine concluded that the horizontal-vertical illusion is due to a retinal quality whereby equal lengths in the vertical direction are referred to greater distances than in the horizontal direction.

Prof. A. D. Waller, F.R.S., read an account of the nerves found in the trunk of an elephant which died near Dundee two hundred years ago. Patrick Blair secured the carcass and dissected until the remains became unfit for further work. He removed the trunk and made a dissection, as the result of which he described different nerves for movement, touch, and smell. The bones of this elephant were ultimately used as a fertiliser by a neighbouring farmer.

Prof. A. D. Waller, F.R.S., by means of the oscillograph, compared the electro-cardiogram with the pulse. He found that a deep inspiration may affect the pulse in two ways (*a*) by actually stopping the heart, and (*b*) by compression of the subclavian artery. Descent of the diaphragm diminishes the potential difference between the two hands, but increases that between the left hand and left foot.

All the reports and abstracts of papers received in sufficient time before the meeting were bound, and copies can be obtained at the British Association offices.

H. E. ROAF.

AGRICULTURE AT THE BRITISH ASSOCIATION.

IN drawing up their programme for the Dundee meeting, the organising committee of the section decided to concentrate attention on three or four subjects, of which one or two should be of distinct local importance. The method worked so well that it is likely to be adopted in future years. The subjects selected were milk problems, animal nutrition, the application of meteorological information to agricultural practice, and the sources of the nation's food supply.

In his presidential address, Mr. T. H. Middleton described the changes that have taken place in the development of agriculture during the past two hundred years, and the address, the main parts of which are printed in NATURE of October 24, p. 235, formed a fitting historical introduction to the work of the section. This was followed by a series of papers on milk. Mr. W. Gavin dealt in a very able paper with the interpretation of milk records. He pointed out that in any statistical study of the inheritance of milk yield, or indeed in any systemised breeding experiment where more than a few cows are dealt with, it becomes necessary to define a cow's milking capability by a single and unqualified figure. Breeders generally depend on such figures as total yield per calf, total yield per calendar year, average per week, &c., but the enormous fluctuations found in the same animal show